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penetrate cocoons? Or the bottoms of shallow ponds? To what depth does the ground freeze?

Skin adaptations: Animals that move about during winter—what defense have they against cold? Differences in covering among animals of the temperate, arctic, and torrid zones? From what animals do we secure our finest furs, wools, and feathers? At what time of year in this climate is this material secured? (The study of temperature variations over the north-western area of the United States will be necessary in connection with this study.)

REFERENCES: "Hibernating Animals," *Science*, May 2, 1884; "Hibernating Mammals," *Science*, Vol. III, p. 538; Weed, *Insects in Winter*, p. 132; Burroughs, *Squirrels and Other Furred Animals*; *Winter Sunshine*, p. 55; Thompson, *Wild Animals*; Ingersoll, *Wild Neighbors*, p. 267.

EIGHTH GRADE.

REVIEW FOR OCTOBER.

HISTORY AND GEOGRAPHY.

KATHARINE M. STILWELL.

THE work in history and geography in the eighth grade during October varied somewhat from the published plan. The change was due to the immaturity of the majority of the pupils, and to their lack of previous training in manual work.

The work consisted of a study of Chicago and its environs. Those members of the class who had traveled over it described the extent of the Chicago plain and its general appearance. Then the whole class examined the soil of this plain—sand, blue clay, and limestone—made inferences as to its origin, and verified these inferences by reading. They also considered the drainage, observing the work of rivers and of the lake.

The advantages of this site for the location of a city, as brought out through discussion, were (1) its position on the divide between the St. Lawrence and the Mississippi basins; (2) its position on Lake Michigan, which makes it a lake port and a railroad center; (3) the varied resources of the surrounding country that supplies the needs of the citizens. These include clay for brick-making, lumber and stone for building, food supplies, raw material for manufacturing, coal to furnish steam power for this manufacturing, and cheap transportation, which has made Chicago a distributing center. The Illinois and Michigan canal was considered as one of the great factors that have contributed to this result.

The children next considered the size, area, and the population of the city. They found the population to be about sixteen to the acre. They did this by staking out a square 208.7 feet on a side, turning the right angles by

means of triangles of 6-, 8-, and 10-foot sides. In considering the distribution of the population in the city, the class was given the figures of population in some of the tenement districts, which range from 206 per acre to (in an extreme case) 875 per acre. The children compared these figures with those taken from Calcutta, Tokyo, and other crowded cities, and found by computation that at this rate a large per cent. of the world's population could be housed in Chicago. Inquiry into the responsibility for this state of affairs caused them to investigate our building laws, and this led them into some study of the system by which our city is governed.

After this the pupils studied the general plan of Chicago—the residence and the business districts, including the public buildings, the parks, etc. Then they proceeded to discover whether in the building of our city we have utilized our resources to the best advantage.

The class visited (1) Lakeside, to study river valleys and the work of the lake, constructive and destructive; (2) the business part of the city, to see the present harbor and the former harbor of the Chicago river; (3) the Illinois and Michigan canal; (4) the drainage canal; (5) the abandoned quarries at Stoney Island, to see limestone and to study glaciated surface; and (6) Wintergreen farm, near Summit, to study farm products. It is not necessary to say that we relied on the observations which the children had made upon previous trips and journeys. They gained additional information by reading. Further, they made paintings and drawings of all the places they visited, and, in addition to this, wrote expositions of the results they had obtained in their work.

NATURE STUDY AND NUMBER.

(FRANCIS W. PARKER SCHOOL.)

ELIZABETH ADAMS.

Nature study.—The class observed and made reports on the plant life on a vacant lot near our school building, the class being divided for this purpose into groups of four. Each group laid off a square rod in the lot, and was responsible for the report on this area. The reports were made in painting, drawing, and oral and written language, and embraced the general condition of plants at this season, including roots, stems, leaves, and seeds; the number of kinds of plants; the number of plants of each kind; the number of seeds produced by a single member of a plant family, by the entire family.

The remainder of the nature-study work was based on a trip to the lake-shore north of the city, on which especial attention was given to the erosion of the shore and the formation of ravines.

Arithmetic.—In connection with nature study the class worked problems similar to the following: If each seed produced a plant, how large an area would be covered by the seeds of one kind of the plants growing on your

area? Allowing forty plants to the square yard, how long would it take this plant to cover the state of Illinois? the United States? the land area of the world?

In addition to these problems the pupils found the amount of materials used in our building and grounds, and the cost: (a) Find the cost of plastering our room at 20 cents per square yard. (b) Find the cost of plastering our room if it is a long, b wide, c high, and cost x dollars per square yard. (c) What is the cost of the lumber in our floor at \$40.50 per thousand feet? (d) Find area, in rods and acres, of the vacant lot. (e) The black dirt in the front yard is 4 inches deep. Find its cost at \$2.25 per load. (f) What is the cost of the cement walk at 19 cents per square foot? (g) Find cost of brick wall. Brick costs \$40 per thousand, laying \$4 *per square*, and concrete 15 cents per square foot. Besides working these problems arithmetically, the pupils were required to put them into algebraic phraseology and then to solve them.

OUTLINE FOR DECEMBER AND JANUARY.

KATHARINE M. STILWELL AND ELIZABETH ADAMS.

History.—Subject: The settlement of the Northwest Territory.

In November the children traced the central and southern routes of travel across the Appalachian highlands.

1. The Mohawk valley as a path for the settlers. The Mohawk a natural route from New England to the West. The influence of the glacial period upon this region; upon its topography, drainage, lakes of New York, and soil. The Mohawk river, the ancient outlet of the Great Lakes. Indigenous vegetation; influence upon transportation. The influence of the glaciers on indigenous vegetation. The lake regions of central New York; British soldiers along the border; hostile Indians; settlers obliged to go through Pennsylvania and over the Braddock Road to reach Ohio; the Ohio Association; flat boats on the Ohio river; settlement of Marietta.

2. The Ohio country: Physical features; why attractive to the New England people; circumstances under which the United States acquired the Northwest Territory; the Connecticut Reserve; the Connecticut Land Company; story of Moses Cleveland; rush into the West.

3. Life on the frontier; conditions for procuring government land; need for a survey; farms set off only by "tomahawk blazes;" legal disputes concerning claims to land lying between original farms; method of settling disputes; action of Congress; how survey was made (see number plan below); journey of the immigrant; location desirable; half-faced camp; clearing the land; log-cabin; growth of settlement; demand for roads to connect the settlements with the East; trade on the Mississippi; the steamboat on the Ohio and the Mississippi; trade cut off from the East.

4. Internal improvements; government aid to Ohio; the Cumberland

road; the Erie canal; rage for canals; beginning of railroads; unification of the North; the corn belt.

REFERENCES: Sparks, *The Expansion of the American People*; Schouler, *History of the United States*; McMaster, *History of the United States*; Roosevelt, *Winning of the West*; Small and Vincent, *An Introduction to the Study of Society*, Book II; Howell, *Recollections of Life in Ohio*; Mills, *International Geography*; Shaler, *Nature and Man in America*; Shaler, *United States*.

Number.—Correlated with history. How the survey was made.

A north-and-south line was run from the southwest corner of Pennsylvania southward to a point on the Ohio river.

Problem 1. Run a north-and-south line from the southwest corner of the School of Education block 300 feet northward and mark it by driving two stakes upon it.

A west line was run at right angles to the north-and-south line.

Problem 2. Run an east line at right angles to former north-and-south line.

Then a series of parallel lines were run westward and a network of six-mile squares was laid out.

Problem 3. Lay off a network of 120' squares by a series of parallels and perpendiculars to the north-and-south line of Problem 1.

The original six-mile squares were called townships. A row of townships north and south was called a range, and numbered in regular order, beginning at the northernmost and passing southward. Carefully marked central lines, run both north and south and east and west across the townships, divided it into quarters. Quarters were named northeast, southeast, etc.

Problem 4. Subdivide one of the 120' squares of problem 3 into townships and quarters and find the acreage of all parts. Name the quarters.

Principal meridians and base lines were then fixed.

Problem 5. Establish two or three meridians at 25' distances by the lengths of forenoon and afternoon shadows of a vertical stick. Mark them by wooden stakes, and then, in a similar way, locate and fix the perpendicular base lines.

Problem 6. Make a plan, to scale, of 16 of these townships in square form, number them, and point out the N. W. $\frac{1}{4}$ of Sec. 6; the N. W. $\frac{1}{4}$ of the S. W. $\frac{1}{4}$ of Sec. 7, Range 2; Sec. 3, Range 2; the S. E. $\frac{1}{4}$ of the S. W. $\frac{1}{4}$ of Sec. 3, Range 4, etc.

Question.—In case the stakes you have set to mark section corners should be pulled up and lost, how could you use the meridians and base line to recover them?

Here the geometry of triangulation will be taken up in an elementary way.

Geography.—The geography of the Northwest Territory will be studied in connection with the history of the settlement and development of that region (see history outline).

Current events are noted in the daily papers and the weekly issues of

The Great Round World and The Little Chronicle. The geography in relation to these events will constitute a feature of the work.

With the opening of Congress the isthmian canal will come up for consideration. As this topic is of general interest, it will be investigated somewhat as indicated in the outline which follows.

I. Necessity of a canal. (1) Location of the land masses of the world. (a) Present North and South America as one land mass with a continuous highland belt on the west, a lesser highland belt on the east, broken by the depressions of Hudson Bay, the Gulf of Mexico, and the Caribbean sea, and a central plain lying between these highland belts. (b) In a similar manner present the eastern continent as a single mass of land. (c) Columbus, Cortez, Hudson Bay Co., etc.; indications of the early need of this passage. (2) Advantages of a water route between our east and west coasts; means of defense; voyage of the "Oregon." (3) The preponderance of our population is in the eastern part of the country. Our ports, New York and New Orleans, are in the East. Our trade is with the nations on the Pacific. (a) Study trade products of North America. (b) Study South American countries—Chili, Argentine Republic, Bolivia, Brazil, etc. Their exhibits at the Pan-American Exposition. Why we send them what they can produce. (4) Our connection with the Orient. Disadvantages of our present route. Our exports and imports. (a) Study India, China, the Long Plateau, Indo-China, the islands of the sea, etc. (b) Why do we send agricultural products to agricultural regions? (c) Why we import manufactured articles.

II. Location of canal. (1) Topography of Nicaragua, Costa Rica, and Panama. (a) Rainfall at various places. (b) Study of trade winds. (2) Proposed routes: (a) Atrato; (b) San Blas; (c) Panama; advantages of this route; probabilities of purchase; (d) Nicaragua; location of Lake Nicaragua; the depression in the continental divide; the San Juan river; its history and present condition.

III. Construction of the canal. (1) The harbors, excavations, cuttings, dam, locks, and the estimated cost. (2) Compare these items with the corresponding items in the construction of the Chicago drainage canal; the Erie canal.

IV. History of these isthmian canals. (1) Ownership of the territory they traverse. (2) How the United States acquired the right to build this canal. (3) What interest England has in the affair. (a) Clayton-Bulwer and Hay-Pauncefort treaties. (4) Relation of France to the Panama canal.

REFERENCES: *National Geographic Magazine*, 1899, and January, 1901; *Mills' International Geography*; compendiums; *Earth and its Inhabitants*; daily press reports; *Review of Reviews*; the *Outlook*.

Science.—Subject: physics of heat.

It is believed that this subject will be of interest to the pupils in both schools, in the Francis W. Parker School because there is a new system of

heating, and in the University Elementary School because the heating plant of the university will be installed in December.

I. How our schoolroom is heated. (1) Visit the power-house, examine the heating plant. (a) Source of heat—combustion of fuel; conditions for good combustion. (b) Apparatus for combustion. (c) Apparatus for conveyance of heat; study conduction and connection. (2) The radiator; the apparatus for heat distribution. (a) Principles of radiation; simple experiments. (b) What determines the number of radiators needed in a room? “rule of thumb” used by builders.

II. How the street-cars are heated. (1) Stoves. (2) Electricity.

III. Methods of heating the homes of the pupils.

IV. Summary of the advantages of these various methods of heating.

V. History of heating. Principle applied at each stage of development.

REFERENCES: J. S. Billings, *Ventilation and Heating*; Carpenter, *Ventilation and Heating*.

Expression.—The time devoted to manual training and clay-modeling will be used in making Christmas presents.

In oral reading the pupils will study Kipling's *Ballad of the East and the West*. They will also present in dramatic form some part of the Christmas exercise. Painting, drawing, and writing will be used as the work in history, geography, and nature study demands expression.

Physical training.—Free exercises: regular practice order continued. Tacto-gymnastics: marching and running in place and from place. Elementary dancing calisthenics (girls): simple change-stepping in connection with flexions, extensions, elevations (legs); repetitions, hopping (schottische steps). Use of hand apparatus: wands, dumb-bells, Indian clubs. Apparatus gymnastics (see physical training outline). Use of fixed poles for climbing purposes: chest bars. Vaulting exercises: vaults and off-swings; forward vaults with standing, walking, and running starts, for control, form, speed. Walking beams: balancing exercises, for poise, balance, and gait. Games—indoor: Three Deep; Hare and Hounds; Hornet's Nest; Lady-smith. Records in standing and running high and broad jumps will be taken throughout the month and charted with the physical measurements and tests.

MORNING EXERCISES.

BERTHA PAYNE.

						LEADER.
December 3.	Current Events	-	-	-	-	Miss Stilwell
4.	Favorite Songs	-	-	-	-	Miss Allen
6.	Stories	-	-	-	-	Miss Mitchell
10.	Early Books	-	-	-	-	Mr. Flint